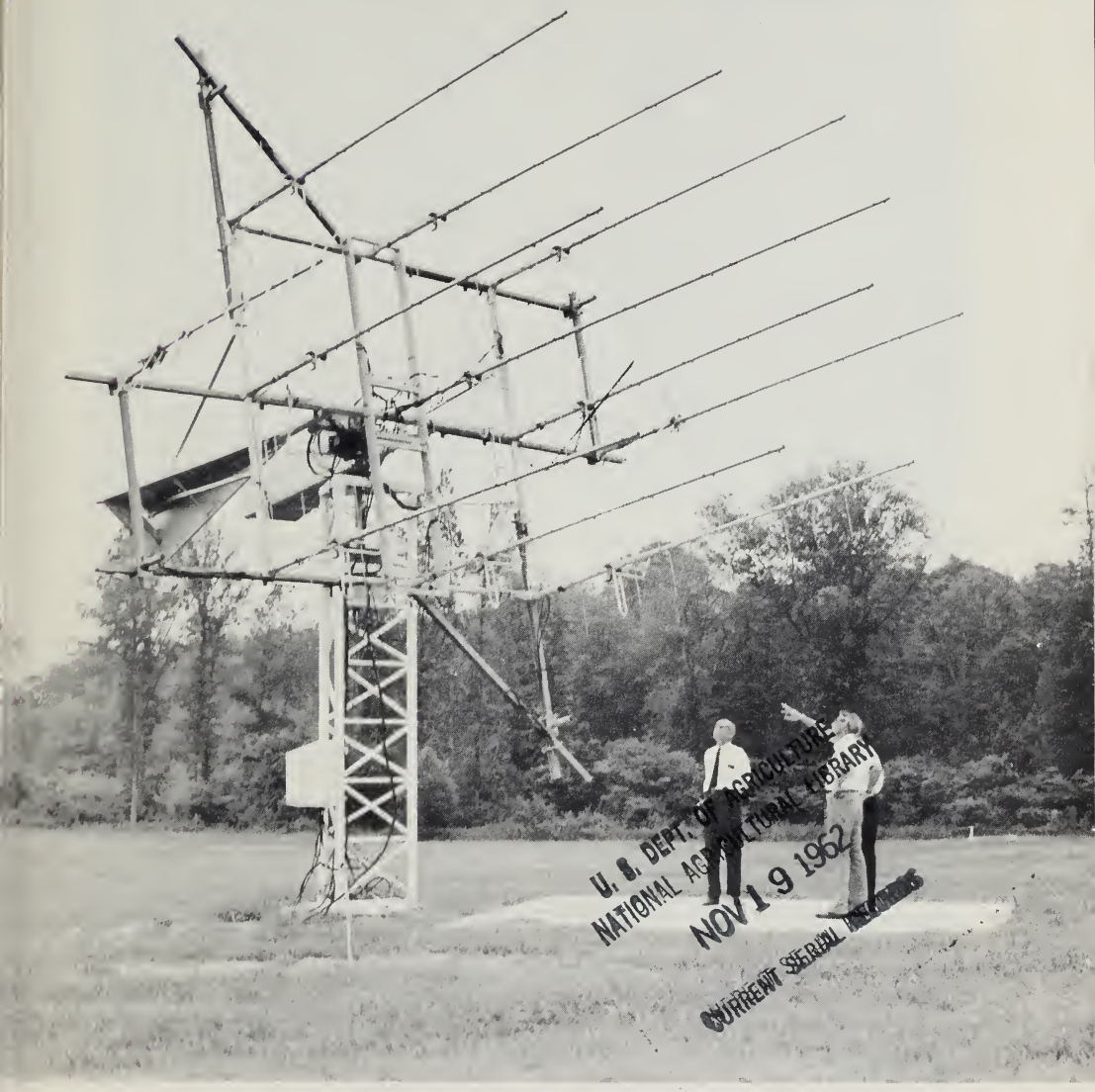
NOVEMBER
1962

Rural Lines

RURAL ELECTRIFICATION ADMINISTRATION • U. S. DEPARTMENT OF AGRICULTURE



Growth through Agricultural Progress

REA BORROWER POWERS SATELLITE-TRACKING STATION . . . See page 9

A Message from the ADMINISTRATOR

Last February REA issued a bulletin (1-7 electric, 300-5 telephone) which made recommendations to REA borrowers on the use of their general funds.

It was issued because the Congress and REA felt that, while some borrowers were using their general funds wisely, others needed guidance, and many were seeking it.

Reception of this bulletin has been most gratifying. As recommended, many borrowers have reduced their general funds to within the recommended limit by advance payments on their loans, payment of capital credits, reducing rates, and/or investing in plant. Some relevant figures show that, for the six months from March through August 1962, advance payments on construction loans increased by $14.2 million as compared with an increase of $5.8 million for the same six months of the preceding year.

In addition, there has been an increase in cash received for the purpose of retiring construction notes in full ahead of the maturity date. For the 12-month period ending August 31, 1962, REA received $6.6 million of such cash payments. For the previous 12-month period it received $3.5 million.

From correspondence and field reports we receive, it is obvious that the number of cooperatives that retire patronage capital regularly is constantly increasing, and so is the amount of capital being retired. Unless capital credits are allocated and eventually disbursed whenever possible, many consumers will continue to have difficulty in distinguishing between cooperatives and other forms of private enterprise. It is regrettable that the management of some cooperatives has not been quicker in recognizing the need for such action.

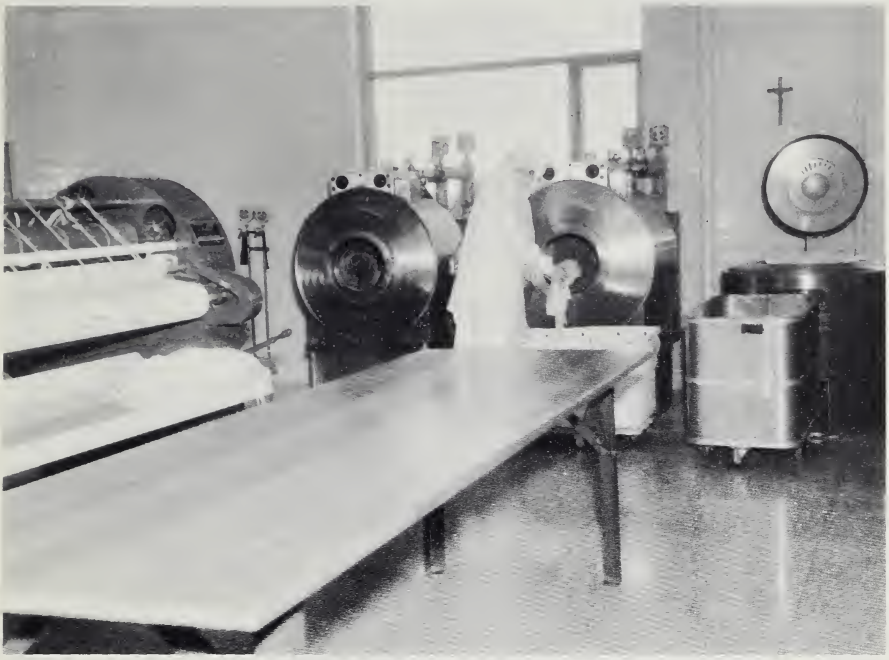
REA headquarters and field representatives will be happy to give advice and "spot assistance" to those few borrowers who are still in doubt concerning the best methods of managing their general funds.

Norman M. Clapp
Administrator

Editor: Samuel Levenson
Contributors to this issue: Lucile Holmes, Bernard Krug
Cover picture: Personnel of satellite-tracking station at Blossom Point Minitrack Test Facility study Yagi antenna which receives telemetry data from earth-girdling satellites. For story and more pictures see pages 9-16.

Issued monthly by the Rural Electrification Administration, U. S. Department of Agriculture, Washington 25, D. C. Subscribe to this publication from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Price $1.50 a year; foreign $2.00 a year; single copies. 15 cents. Use of funds for the printing of this publication has been approved by the Director of the Bureau of the Budget, January 31, 1960 • Vol. 9, No. 6.

No. Dakota Cooperative Serves All-Electric Convent Building



All-electric laundry of the Convent of the Sacred Heart, North Dakota.

Selling electric space heating to 85 homeowners at once would be a good day's work for any cooperative. Cass County Electric Cooperative recently made the equivalent of such a sale when the new, all-purpose building of the Convent of the Sacred Heart, three miles south of Fargo, North Dakota, went all electric. Its 96,000 square feet of floor space is equal to the area of 85 three-bedroom homes.

This handsome 4-story brick building, of strikingly modern design, is set in an 80-acre expanse of ground owned by the Roman Catholic order of the Presentation of the Sacred Heart. It is the residence of nearly 200 nuns, many of them teachers in schools of the diocese. The order also operates a nearby hospital and an orphanage.

Mother Catherine, mother superior of the Convent, explained that the original building was destroyed by a tornado in June, 1957. The new building was opened in March, 1960, as the nucleus of a junior college long planned by the order. This central building has been designed so that several rooms can be converted to different uses as the college expands and grows. For example, the section of the building two stories in height, which now is a chapel, eventually will be turned into an auditorium. At present, all the daily living needs of the sisters are contained in this one building—small individual sleeping rooms, kitchen, dining room, laundry, several classrooms, and music rooms.

And throughout this big building,

Continuing an age-old custom, nuns prepare altar bread in this ultra-modern kitchen for all Roman Catholic churches in the diocese.

electricity provides the heat and light, cooks and preserves the food, and handles all the laundry work.

Meal preparation at the convent includes baking all breads, cakes and pastries. In addition, the sisters make the altar bread for all churches in the diocese. A rather specialized use of electricity enters into the preparation of the altar bread. The dough is baked in paper-thin sheets, which are very crisp when they come out of the oven. These are placed in an electric humidifier, which adds enough moisture so that they won't crumble when slid under the electric cutter and cut into the delicate round wafers used in the communion service.

The decision to electrify the institution completely was based largely on assurances by the cooperative that electricity guarantees top efficiency, cleanliness and safety. Another factor considered was the plan for eventual expansion into a junior college, and the advantage of selecting a heating system that would grow as the school grew. Underground conduits were installed at an additional cost of only $200; these will make it possible to extend electric heat into the next building to be constructed. This is a very small sum compared with the investment that would have been required for a fuel-fired heating system large enough to include the new buildings as they are added.

Electric heating also cuts janitorial care to a minimum. The caretaker (who lives with his family in a house on the grounds) spends only about two percent of his time on maintenance of the heating system. Thus he has ample time for his other custodial duties, and also is able to drive the convent bus.

Heating, ventilation, and all other

electrical functions are controlled by an electro-mechanical programming system. Timers are set to turn up the heat early in the morning, set it back in the sleeping rooms during the daytime, when practically all the sisters are away at their teaching assignments, and then to turn up the heat late in the afternoon, as they return to the building. Through the programming system, the rising bell and the angelus chimes are sounded, and the bells announcing meals are rung. The water-heating controls are set so that this chore is performed during off-peak periods.

An outdoor thermostat controls the building temperature in relationship to the outside temperature. When the thermometer registers higher than 35 degrees, only one-half the heat comes on. When it falls below 35, the heat comes up.

Good insulation is, of course, a vital requirement for success in electric heating. At Sacred Heart Convent this has been achieved by bonding a 4-inch layer of lightweight plastic foam to the masonry. Use of this highly efficient insulating material made a vapor barrier unnecessary. It also simplified the inside finishing of the building, since plaster can be applied directly to the plastic foam.

Baseboard heaters are used in all individual rooms, and as supplementary heating in the dining room and classrooms, where there are electrically operated unit ventilators. Convection heaters furnish the necessary heat in the corridors, and also at the main entrance to the building.

During the first year of operation, there was considerable curiosity as to what the annual cost would be for heating, lighting and running all the electric equipment in the convent. The Mother Superior and the Cass County Electric Cooperative were closely concerned, of course, and so also were REA's power use specialists—particularly those dealing with electric heating. Lacking experience with any installation even approaching this one in size on which to base an opinion, the cooperative estimated that the bill might run to $50,000 for the first year—admittedly a high figure. Everybody was pleasantly surprised, however, when the total cost for the year from February 1, 1961, to February 1, 1962, proved to be just about half this amount. This period included a winter that was 1.7 percent colder than normal.

Owing to the great interest in this subject, manager Willard Grager recently made a second study for the period from June 14, 1961, through June 14, 1962. The Convent used 1,776,000 kwh during that year, at a cost of $27,861.40. On the basis of 85 homes, this would be an average of $327 each for lighting, cooking, heating water, space heating, and ventilation. Patronage credits allocated to the Sisters during the calendar year 1961 amount to $2,498.84. This would reduce total costs to $25,362.56.

This experience has apparently started a trend in the area. The new North Central School District has gone all-electric with a 46,000-square-foot building that will be served by the Rogers substation of Cass County Electric. The addition to a school in Colfax will also be all-electric. More and more, school trustees are becoming impressed by the ease of operation, the cleanliness, and the safety of all-electric operation; the convenience of having individual temperature control in each room, the ability to do without a boiler room, and the decreased cost of custodial and engineering services. Manager Grager stresses this last point. "Without a doubt," he says, "all-electric systems are the most practical for schools or other institutions which must have hired custodians. Fuel-fired systems require much more operating help, which adds considerably to the cost."

Borrowers Urged To Exercise Caution in Selection and Use of Aerial Lifts

Important reservations concerning the use of insulated aerial lifts and baskets are expressed in a recent REA bulletin (168-4).

The bulletin advises borrowers that, in the interests of safety, these devices should be used for positioning purposes only, and in conjunction with gloves, hotsticks, and all other safety equipment.

A lineman who uses the bare hand technique or gloves without sticks, says the bulletin, may readily bridge conductors or parts energized at different voltages. It describes several conditions that might create trouble:

1. In the process of tying or untying a live conductor on a pin insulator, there are about six inches between conductor and crossarm. This small separation gives rise to hazardous operations.

2. The separation between phase conductors on vertical corners is also small. This, coupled with the unknown tensions on vertical corner insulator strings, creates a danger for men working close to the conductors.

3. Tree limbs or brush may bypass basket insulation while men are working on live conductors.

Even while the bulletin was being printed, there occurred on an REA borrower's system a fatal accident which illustrates the bridging hazard that arises when an operator works in close proximity to high voltage conductors. In the course of a job requiring relocation of the neutral, the worker moved the basket to a position between an outer phase conductor and the system neutral which was temporarily supported by the phase crossarm. The clearance between phase conductor and neutral was too small; and the upper boom made contact with the phase conductor at the same time that the neutral was in contact with the operator's body. Although fully insulated, the boom had an exposed metal bolt which proved to be the point of contact with the phase conductor. The operator received fatal burns when his body completed the path to ground.

Aerial lift devices are available in many forms, and are designed for several types of line operations. In general, they may be of the derrick type, the ladder type, or designed primarily for positioning a man and his tools for easy access to line conductors. Combinations of these general classes are available, with capabilities varying widely. Consequently, any REA borrower contemplating the purchase of one of these lifts should study many of the models available and assure that the unit will safely meet loading and duty requirements. He should note, for instance, that the safe-loading rating of the insulated basket ranges between 300 and 600 pounds, depending on the make. This rating is intended to carry safely a man and necessary tools with out-riggers down and the equipment properly positioned. Exceeding the advertised basket load rating may cause basket breakage or, in some positions, tip the vehicle.

Manufacturers claim many safety factors but they have little meaning since the various materials used are not fabricated to common standards of strength. The safest policy is to adhere strictly to the basket load rating. This limits the use of a basket to carrying a man and his tools. Transformers and other line equipment should not be lifted by attaching them to the basket.

The bulletin further points out that the safe lifting capacity of different booms varies widely. A boom with a 2,000 pounds safe working load rating may tip the vehicle in some position when loaded to much less than that weight. In no case should the advertised safe working load of the boom be exceeded.

In addition some aerial lifts exhibit considerable sway in wind, or when controls are operated suddenly. This can make working conditions difficult and even hazardous.

Borrowers are urged to examine control systems, which vary widely among manufacturers, to see that they meet the following requirements:

They should be so designed that the basket will lock in position under any condition of power or control failure. Provision for emergency lowering of the arm if the control system fails would seem to be essential.

Safeguards must be built into the system to prevent dangerous overloading on hydraulic cylinders. Though these are usually provided, it must be realized that they do not provide protection against vehicles overturning or the breaking of booms, baskets or other parts.

Components of the control and hydraulic system should not reduce substantially the rated insulating value of the boom or basket in any working position.

The controls should be capable of being locked while work is being done from the basket. The basket, when in the locked position, should not drift. The controls should be so designed as to prevent accidental starting of the control system.

Dual controls seem to be highly desirable. The lower controls should be so located that the operator stands on the bed of the truck or on a suitable platform when he operates them. REA emphasizes that the controls must not be located in a position which permits or requires the operator to stand on the ground.

Since every control system is influenced to some degree by a temperature, the manufacturer should be requested to provide information on any tests he has made and on any special measures he has incorporated to provide for temperature variations.

It is essential, says the bulletin, that aerial baskets have excellent insulating characteristics in order to provide safe conditions in case the basket makes accidental contact with energized conductors. The dielectric strength required is determined essentially by the maximum voltage of the system on which it will be used. On distribution systems operating at voltages up to 14.4/24.9 kv, a minimum rating of 50 kv should be adequate. For higher voltage systems, a minimum rating equal to twice the line to line voltage appears to be the minimum acceptable.

Until standards are developed, REA suggests that the voltage rating of an aerial device be demonstrated by its ability to withstand an a-c voltage equal to its rating for a period of one minute without exceeding a leakage current of 0.5 milliamperes. The test voltage should be applied between the top and base of the assembled boom and repeated for various positions of the boom and control rods. The basket should be tested separately, and it should withstand rated test voltage for one minute without puncture. The limitation on leakage current does not apply to this basket test.

Any aerial device will be subject to contamination, weathering, and injury which, in time, will affect the dielectric strength of the equipment. Periodic inspections and maintenance will be necessary to maintain the equipment in a safe condition. If adequate test facilities are not available on the system, it is recommended that insulated

basket liners be used. Sufficient liners should be obtained to permit rotation of the liners on a monthly basis. The liners which are removed should be sent to a laboratory with adequate facilities for testing their suitability for re-use. At yearly intervals, or sooner if believed necessary, arrangements should be made to test the boom and basket thoroughly at a laboratory with adequate facilities. At this time the leakage currents should be compared with those obtained when the equipment was new. Any increase in leakage current above one milliampere should be reason for concern and action, if routine washing does not restore the dielectric strength.

The REA bulletin notes, finally, that the use of insulated aerial devices near live lines introduces greater hazards to persons standing near the vehicle or physically touching it than does the use of other types of vehicles. For this reason, it recommends that aerial lifts should be provided with ground bond connection points and that requirements listed in an earlier bulletin dated June 26, 1961 (REA Bulletin 168-12) be rigidly followed. □

Revised REA Manual Looks to Future Needs

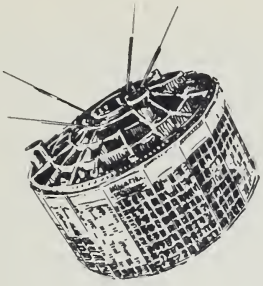
A new edition of a basic REA manual, "Specifications and Drawings for 7.2/12.5 Kv. Line Construction," has been issued. Known as REA Form 804, this revision, the first to be made since August 1956, incorporates a wealth of past experience on the part of REA borrowers, job training and safety instructors, and operations personnel.

At the same time, the new edition looks to the future. Its drawings reflect the growing demand for working on lines without de-energizing them. Three leading manufacturers of hot line tools reviewed the booklet, drawing by drawing.

The REA Electric Standards Division, which produced the booklet, also kept in mind the possibility that some lines may be converted to 14.4/24.9 Kv. at a future date. Structures were designed to take this into account. For instance, guy positions were standardized so that the clearances to energized parts would be adequate to minimize radio noise problems frequently experienced at the higher distribution voltage.

REA Form 804 has played a long and distinguished role in promoting one of REA's greatest achievements—that of standardizing transmission and distribution lines and associated equipment for its thousand electric borrowers through the nation. The results can be dramatic—as when a system is damaged by snow, sleet or windstorm and a crew comes in to help from a cooperative some distance away. Because of standard pole arrangements, the new crew can work with confidence and efficiency, and can even replace nuts, bolts and other equipment from stock brought with them.

But aside from drama, standardization permits the application of mass-production techniques to the construction and maintenance of electric power lines. As a result, construction personnel become expert, efficiency improves, and over all costs decline.



Satellite Tracking Station Powered by REA Borrower

Early dawn is just beginning to silhouette the cabbage palms and gantries at Cape Canaveral. Tense groups of people are watching the Delta rocket pad. The big rocket ignites, lifts off the pad, and roars upward.

Is the Delta on course? Will her stages ignite and fall away as planned? Will her payload, the Tiros weather satellite, separate as scheduled and inject into the planned orbit? Will her cameras work?

People on the ground need to know these things immediately. The scientists and technicians of the National Aeronautics and Space Administration need to know. Reporters want the word on success or failure to flash to the world's press.

They aren't long in finding out. Almost immediately—within seconds—the first of a stream of reports come in from stations of the Minitrack network, the world-girdling tracking system of the Goddard Space Flight Center, near Greenbelt, Maryland.

Among the first reports will be one from the Blossom Point Minitrack Test Facility about 740 miles north-northeast of Canaveral, on the Maryland shore of the Potomac River. Its antennas, computers, and other systems are powered with electricity from the Southern Maryland Electric Cooperative at Hughesville, Maryland. The electrons act with incredible speed to compute position, altitude, and course—they've tracked spacecraft as far away as 400,000 miles.

Other Minitrack stations are located in Florida, Newfoundland, England, South Africa, Australia, Ecuador, Peru, Chile, Alaska, California, and Minnesota.

Earth-orbiting unmanned satellites tracked by the Minitrack network include the communications satellites Echo, Relay, and Syncom, and the meteorological satellites Tiros and Nimbus, all of which originate at Goddard. Telstar, the privately-built communications satellite, was built to Goddard specifications, monitored by the Goddard center, and boosted into orbit by Goddard's reliable Delta rocket. The purely scientific satellites—the Explorers, OSO, OGA, OAO—are mostly of Goddard origin also.

Blossom Point, like all the Minitrack network, is operated by personnel of a private corporation under contract to Goddard.

Bruce A. Robb, Jr., who works for the corporation, is supervisor of the Blossom Point station and its 33 employees. A native of Valparaiso, Indiana, he has lived at one time or another in many parts of the world.

"Most of us have," says Mr. Robb. "We are able to adjust to living anywhere. The process of adjustment is easy here in Charles County, Maryland. It is a pleasant rural environment, with all the advantages of city living—good roads that can get you to the city in a hurry, and dependable electricity, with which you can build almost any sort of an environment you want."

Transformer and lines leading to Blossom Point's 150 KVA substation of Southern Maryland Electric.

The crew works around the clock, in shifts. Satellites appear in line of sight of the Maryland station at all hours of the day and night.

The station consists of a few buildings and a few antennas in a 25-acre clearing in pine woods.

Base line antennas, laid horizontal to the ground in the form of a huge cross, locate the position of satellites. From the center, the antenna lines extend exactly north-south and east-west. At the exact moment a satellite crosses zenith (moving from west to east, when it crosses the north-south line, and vice versa), antennas on both the zenith line and the right angle line receive the signal. The length of a radio wave will vary with the distance from transmitter to receiver. The difference is infinitesimally small, but the intricate equipment of the Minitrack station can measure it. Consequently, the position, altitude, and direction of travel of a satellite crossing the zenith line of a tracking station can be determined, thanks to the ability of modern electronic equipment to solve complicated mathematical problems with the speed of lightning. All that is needed is one known measurement factor on the zenith line with which the other measurements can be compared.

Obviously, Goddard's Minitrack computing equipment has to have stored in its memory compartments a tremendous number of predetermined measurements—wave length measurements translated into distances from each antenna.

Satellites transmit tracking signals on frequencies in the 108 and 136 megacycle bandwidths. The former is no longer used for new launches, though a 108 receiver is kept to track satellites which have been, and will probably continue to be, in orbit for a long time. Vanguard I, for instance, may last for 200 years or more. The receivers, known as triple conversion superheterodyne receivers, unscramble the analog signal, and it is then converted into digital form.

The data is automatically tabulated, and teletyped to Goddard Center computers. The information obtained from Blossom Point is combined with information flowing in from the other tracking stations around the world. Shortly after a satellite has made two passes around the world (about 90 minutes each for the average earth-orbiting spacecraft in typical equatorial orbit), its apogee (furthest point from the earth), perigee (closest point to the earth), period (time it takes to circle the earth), and inclination to the equator can usually be determined. These figures are recomputed and refined constantly.

Tracking requires that time be synchronized throughout the network with great accuracy—the timing oscillators at the Blossom Point station have a time drift of less than one millisecond per day from that of the Bureau of Standard's Radio Station WWV. The station's time standards are calibrated

once every three months with a 40-inch astrographic camera which is located in the exact center of the base line antenna.

The process is as follows. On a clear night a DC-4 aircraft is flown from the north exactly along the north-south antenna line. A time signal is flashed by radio to the plane, which activates a flashing light from the aircraft. The camera's picture of the light against the background of stars, whose position in the sky in relation to the time of day is known with certainty, can determine with accuracy any drift in the station's time standard.

The same camera is used for tracking satellites optically. The orbit of Echo, the balloon satellite, is determined this way. The satellite's path, punctuated with "bump pulses" electronically applied to its trail on the camera's plate, shows against the star background. Distance can be measured by a star chart on an acetate overlay.

The Minitrack stations also receive scientific data transmitted from satellites. Satellites are usually powered by solar cells. This means that power must be conserved since, in passing around the earth, much of the time is spent in the earth's shadow. Therefore, satellites do not constantly transmit. Experimental data is recorded on tape, then transmitted only when the satellite is commanded by signal from a tracking station.

Nine-element Yagi antennas are used to command and receive this data. The antennas have remotely controlled azimuth and elevation positioning capability on top of their 15-foot towers. They may be elevated, pointed and turned from the control building, from a position alongside the telemetry receivers. The data is then recorded on tape, and mailed to Goddard or scientific experimenters at universities around the world.

"We get our pass predictions from Goddard by teletype," says Paul Meyer, operations engineer for tracking. "So we know when and where to track. The same goes for reading out telemetry. The workload varies. We usually read out satellites when they are nearby. If they are closer to another station, that station reads out. You can see 62 Alpha Alpha on the board. That is Tiros V, the weather satellite. Scientists use the same terminology for artificial satellites that they do for other heavenly bodies—the year launched, then Greek letters alphabetically. This Tiros wasn't the twenty-fourth satellite launched in 1962, however. The Greek letter system includes spent rockets and other components which are orbiting."

The Blossom Point station is a good load for the southern Maryland cooperative. Demand runs about the same around the clock, and there is little difference from winter to summer. There is a slight peak in winter when more lights are in use. Bruce Robb says that checks over 15-minute periods show a steady demand of 90 kw in winter.

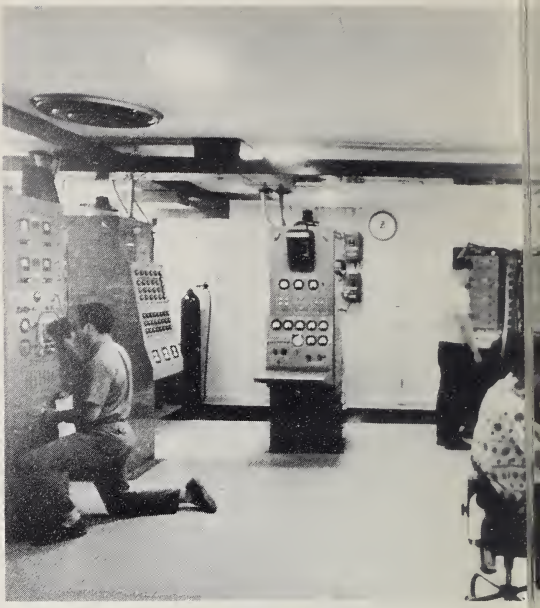
The station, like all the space program's installations, is well equipped for emergency power. Standby power which can instantly cut in automatically is obviously necessary for tracking objects which are moving at 17,000 miles per hour. Redundancy is the word scientists use to describe this particular requirement of space flight.

Blossom Point's 150 kva three phase substation is backed up by three diesels with a capacity of 30 kw each. Another three phase trailer-mounted substation of 75 kva capacity is available for special space shots from Wallops Island, NASA's launch site almost due east from Blossom Point on the Eastern Shore of Virginia. This site specializes in non-orbital scientific rocket probes of the upper atmosphere and ionosphere.

Henry Hill teletypes raw tracking data to Goddard Space Flight Center.

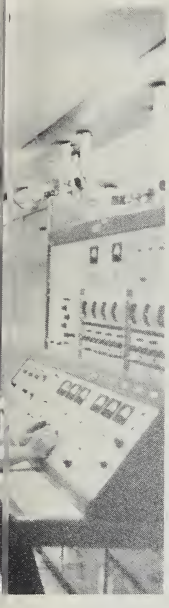
"We've never had a power outage, though," says Henry Hill of Rock Point, Maryland, the only local man on the crew. "We get good service from Southern Maryland. My folks are members, and I'm getting married soon, so I'm looking forward to membership in the cooperative."

An REA borrower since 1936, Southern Maryland Electric serves over 26,000 rural consumers in Calvert, Charles, Prince Georges and St. Marys Counties. It operates 203 miles of transmission line and 2,817 miles of distribution line. On December 30, 1960, it was granted an REA loan of $18,736,000 to construct at 99,000 kw steam generating plant. It has made payments of almost $5 million on its previous loans.



Tracking receivers Jerry Washburn (left) at tim Nay (in back) at digital recorder; Henry Hil

Jim Ryan checks up on telemetry from satellit range of Blossom Point. Sensors on satelli and amounts of radiation in the ionosphere, r



dard unit; Jim
ceiver console.

Bruce Robb marks up a scheduled satellite pass on the schedule board.

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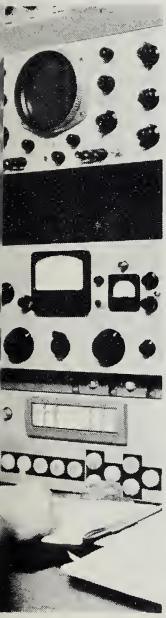
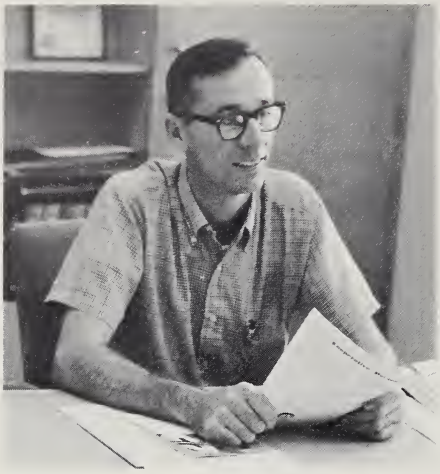
them on tape.



Paul Meyer focuses Blossom Point's 40-inch optical tracking camera.

Iowa Cooperative Makes Haste Slowly



Jack K. Hicks, manager.

At first glance there isn't much to distinguish Linn County Rural Electric Cooperative from most other REA borrowers in the Nation. Its territory is in eastern Iowa and its headquarters are at Marion (which it does not serve), not far from Cedar Rapids.

Its history and growth are typical. When its lines were energized in 1939, it had 439 consumers, who used an average of 55 kwh a month. In 1945 it had 2,000 consumers, who were using twice as many kwh. By 1950 another thousand consumers had been added, and average monthly consumption had increased to 280 kwh. Now the cooperative has 4,266 consumers who use almost 700 kwh a month.

Its other characteristics are equally typical. Population density on its lines is 3.5 consumers per mile, pretty near the national average for REA electric borrowers. Whereas its consumers were once all farmers, the cooperative now serves 1,000 suburban residents, almost one-fourth of its total, and it has some 363 seasonal residents on its 1,200 miles of line. With Coralville Reservoir finished, with Lake McBride also located in the territory, and with three rivers flowing through it, manager Jack K. Hicks expects to add another 500 seasonal services by 1970.

The cooperative has an equity of about 41 percent (somewhat above average). It has made two patronage credit payments—one in 1959 for the years 1939, 1940, and 1941, and one in 1960 for the years 1942 and 1943. The amount disbursed was $62,850. In 1957 the cooperative lowered its rates.

One thousand persons usually attend annual meetings, held on the Thursday afternon following Labor Day. About $700 is spent on door prizes. The cooperative erected its new building in 1954.

But when you take a second look you perceive that this cooperative has individuality. It is a shrewdly-run, efficiently-managed enterprise which proceeds on the philosophy of making haste slowly. It covers all bases. It understands the temperament of its member-owners, and never loses sight of its objective—to provide electric service at the lowest possible rates. Its growth is the result of something more than economic good fortune.

It is based, for one thing, on the realization that an informed board of directors and a loyal membership are invaluable instruments in the functioning of a cooperative. The cooperative, therefore, does not hesitate to spend $1,800 a year on advertisements in local weeklies alone. In addition, as a member of the Eastern Iowa Radio Group, it joins with 11 other cooperatives in sponsoring University of Iowa football and basketball games, the State boys and girls basketball tournaments, and a radio show three times a week. It issues monthly a handsome newsletter and sees to it that, in addition, all consumers receive copies of the Statewide association's magazine.

This prosperous Iowa farm requires more kwh than the 700 used by the average Linn County REC consumer. The 8-unit all electric apartment house (below) is a rare type of consumer on its lines. In front is 100-KVA single phase transformer, fed by an underground cable, which serves the building.

Under the direction of power advisor Glenn Lovig, a graduate of Iowa State University with a B. S. degree in agricultural engineering, it stands ready day and night to meet any electrical emergency. As Lovig puts it, "It isn't like the old days, when electricity was used just for lights and maybe refrigeration. We now have some farmers who use from two to three thousand kwh per month. They have bulk milk coolers, usually with 1½ hp motors, milking machines, automatic equipment for cleaning barns, silo unloaders, and augers for mixing feed. Some are even heating their barns electrically. We offer no particular come-ons to induce farmers to introduce such machines, but we're always ready to point out ways in which they can get their work done easier and more cheaply, even when it might mean they're using less power. We also remember that the farm wife is responsible for most of the growth in kwh consumption that's taken place. The important thing is that we are aware of when and how electricity can help both the farmer and his wife, and we are always at hand and ready to give them that information."

Figures show that this policy pays off. Not only do half of the consumers have hot water heaters, but 130 homes are heated electrically and 200 security lights are serviced.

All of this reflects in some measure the basic philosophy of manager Jack K. Hicks. Holder of a B. S. degree in electrical engineering from the University of Iowa, he has worked for Linn County Electric since 1949, and has been its manager since 1953. He feels that "You go as far as you can without pushing things. You don't force policies on your board of directors or your membership. You let matters develop—but you're always aware of what has to be done and always working toward those goals."

One illustration of his philosophy is seen in his relationship with his power supplier and with the commercial utility in nearby Cedar Rapids. Linn County REC, together with other cooperatives in the area, gets its power from the Central Iowa Power Cooperative, whose office is next door and which is itself an REA borrower. CIPCO's generating facilities are located in Cedar Rapids and are operated by the utility there. All three groups work in close harmony. The integrated transmission facilities enable the distribution cooperatives to get wholesale power at reasonable costs—reasonable for the area—and service disagreements rarely arise. In fact, the private power company has transferred 60 outlying consumers to Linn County REC, and the cooperative in turn has transferred the same number to the Cedar Rapids company.

Much of these good relations is attributed by manager Hicks to the fact that all engineers from the three groups are members of the Cedar Valley Subsection of the American Institute of Electrical Engineers. At some time or other, Hicks has held every office in this group.

At the same time, Hicks foresees problems ahead. It is not a situation that can last. With both Cedar Rapids and Marion engaged in annexing land. a grave problem of territorial rights looms ahead. The eventual solution, Hicks believes, lies in new State legislation that safeguards cooperative territory. Only in this way can Linn County REC and similar cooperatives continue to meet their obligations to their consumer-owners and REA. □

Winter is here.

Drive carefully.

See back cover.

Recipe for a Prosperous Telephone Company: a Prosperous Community

For a rural community to improve its economic condition, it must have natural resources and skilled manpower.

It also needs resolution and drive.

These more intangible elements are found in profusion in the town of Amery, Wisconsin (65 miles from the Twin Cities, population 1769). A man who shares and has largely inspired this self-confidence is George F. Griffin, its mayor since last April. Handsome but unaffected, easygoing but effective, he owns and operates the Amery Telephone Company.

True, his town has many natural advantages. It is in the center of a prosperous agricultural area (average size of farms 120 acres, with some running up to 460). Dairying is the principal occupation, but oats and corn are produced in quantity. It has the enormous recreational advantages of three unspoiled lakes, and a river running through it.

But the fact that it has a medical center, a county nursing home, a good school system, a low tax levy, and an electronics plant that employs 400 persons—all that is because of the energy and optimism of George Griffin and people like him.

As a telephone manager, Griffin has other valuable assets: a desire to expand and serve even the most remote resident; a belief in the value of telephone communication; and faith in people—both his employees and subscribers.

Both sets of qualities might be considered hereditary. For his grandfather, the first George F. Griffin, served a term as village president, founded the town's first telephone and electric system, fathered the first child after the town was incorporated in 1887, served as first postmaster and first fire chief, and built the first store.

It was in 1897, when Amery was changing from a lumbering to a farming area, that grandfather Griffin and two other businessmen founded the Amery Telephone Company. With $900 of their own money and a loan of $500 from the local bank, they bought a switchboard for $129, rented an office, and hired an operator for $10 a month. By the end of the first year of operation, a subscriber could ring 31 other subscribers in town and 4 in the county.

Five years later, with its lines running out to Deronda, Shiloh and Solum Corners, the partnership was dissolved and a new corporation was formed with George Griffin as president and general manager. Now called the Amery Electric Company, it provided electrical as well as telephone service. The operation was unique. Subscribers to this new service could have all the electricity they wanted — provided it was obtained after sunset and before sunrise. Transmitted through lines strung on telephone poles, the power came from a generator hooked up to the water mill of the Northern Supply Mill. The company paid Northern Supply $250 a year and enough free electricity to light 20 bulbs.

Meanwhile, the telephone business continued to grow. Several small rural telephone companies were formed by farmers between 1905 and 1916 which "bought" switchboard service from the

Amery Electric Company. Each subscriber paid 25 cents per month. But the company built its own telephone lines to Joel, Ranger, Deer Park, Jerdee's Corner, and East Lincoln. Subscribers here were charged 80 cents per month for service.

In 1919 the electricity franchise was sold but the company retained the word "electric" in its name until 1944 when it resumed the name of Amery Telephone Company.

The company was hurt badly by the depression. Many subscribers paid their bills with vegetables, poultry and stove wood. As late as 1946 the company had 500 discontinued telephones stacked up in its warehouse. It fought back by stringent efficiency measures and by purchasing whatever independent rural telephone companies it could and merging them into the parent organization.

But by 1954 it was apparent that capital requirements had outgrown local resources and that only with the assistance of the Rural Electrification Administration could proper dial and extended area service be supplied to the inhabitants of the area. With the aid of an REA loan made that year, the company purchased the Little Falls Rural Telephone Company, Deronda-Dwight Telephone and Deer Park Telephone, and converted the entire system to dial. In 1958 a second REA loan enabled the company to purchase and convert to dial the Clayton Rural Telephone Company.

Now the Amery Telephone Company, with exchanges at Amery, Clayton, and Deer Park, is able to serve 2,536 subscribers (as compared to the 1,511 it served only 7 years ago) living in an area of 244 square miles. The latest achievement was accomplished last September when extended area service was provided to 440 Turtle Lake subscribers.

From 1897 until his death in 1937, the original George F. Griffin was president and manager of the company. His son, H. N. Griffin was president from 1937 until he died in 1955. During his last 12 years he was manager also, having previously worked as an electrical engineer for the Milwaukee Railroad.

Thus the present George F. Griffin can be said to have inherited the tradition of working for both the telephone company and the community. Born in Amery in 1921, he was educated in Minneapolis, but worked summers in Amery on the company's lines. After World War II, during which he served in both European and Pacific waters as an electrician second class, Griffin returned permanently to Amery to work with the company's construction crews. He became wire chief in 1952, and since 1955 has been president and manager.

Mostly but not entirely family-owned, the firm now employs George's brother, Glenn, as company secretary and plant superintendent. Another brother, Richard, works on outside plant. A third brother, Howard, who works for a Minneapolis concern, is vice-president. John Sorensen, who installs and maintains the central office equipment, is the firm's treasurer. As an electrician first class, he was George Griffin's boss on a cruiser during the war, but, as this situation shows, neither bears any scars from the relationship.

As a telephone man, George Griffin has strong convictions—and works hard to put them into action. He believes it pays to keep informed on changes in technical operations and office procedures. Always eager to investigate new ways of doing things, he does not hesitate to visit other companies to inspect their practices. In 1956 he introduced stub billing, and expects to use the same machine (it cost $4.000 second-hand) for ledger and journal bookkeeping.

He believes it is necessary to "sell" telephone services and is willing to pay for advertising on the use of extension telephones, of lighted dial telephones, of PBX boards and the like. He appears once a week on the local radio, and visits the local schools to teach children the proper use of telephones. His handsomely laid out directory carries advertising on the use of these "extras." His newsletter goes to all residents, not merely to subscribers. He tries to visit every new house built in the area and put in wiring, in the conviction that if the house is wired, some occupant is eventually going to want a phone. He says that his expenditures on promotion and advertising are the largest of any telephone company of comparable size in the State.

These people are assembling magnetic memory components in new building brought to Amery by Development Corporation. Most employees are women.

He encourages all his employees, both plant and office, to bring the message of telephone indispensability to everyone they meet. He has sent five of them to merchandising courses given at the University of Wisconsin. He advises all employees who have direct contact with subscribers and potential subscribers, "If all of us sell, the company prospers and salaries go up."

His work is paying off. Engineering is in process for a $300,000 improvement program that calls for all exchanges to be redesigned with the Amery exchange building for 1-, 2-, and 5-party service instead of the present 1-, 2-, 4- and 10-party service. The percentage of extensions has gone from 8 to 14. The number of subscribers, PABX boards, cordless boards, key set systems and two-line telephone systems used by business firms steadily creeps up. Most significant of all is the fact that the percentage of residents with telephone service has gone from 45 to 90.

But basically, George Griffin believes that a telephone company prospers only to the extent that the community in which it is located prospers. In accordance with this philosophy, Griffin was one of the principal founders of the Amery Industrial Development Corporation, which started with $2,500 of capital raised by the sale of stock to local people. He and others were worried about the lack of business and industrial progress in the community, and the constant loss of young people. The Corporation began by persuading the county board to place its contemplated home for the aged in Amery (the county previously had none). Griffin and his colleagues argued that the town was the largest in the county, and that its splendid cooperatively-owned Apple River Memorial Hospital was available to meet the residents' needs. It offered the land next to the hospital free, with utilities installed. It took no fewer than 23 votes to get the resolution passed. But as a result, Golden Age Manor, with 70 residents and a staff of 40, is now located in Amery. An addition is now being built to house another 40 residents.

After selling more stock, the Corporation proceeded to offer a Minneapolis electronics firm, that was looking for a place to resettle, a 12,000 square foot building to be paid off in 20 years, complete with utilities, on a city-owned industrial park. After two and a half years of negotiations, the firm accepted the offer. It has now added another 12,000 square feet to the building. It employs 400 people, mostly wives of farmers. Having hired up all the unemployed in town, it is now drawing employees from 50 miles away. Operations in the new building started in 1960.

The Development Corporation has issued a handsome brochure relating Amery's advantages for industry and recreation, and is now attempting to induce a metal factory whose building is being erased by a new highway to settle on a 17-acre, city-owned tract next to the electronics plant.

The number of civic positions that George Griffin now holds and has held would gladden the hearts of his forbears: mayor; secretary and president of the Industrial Development Corporation; treasurer, vice-president and president of the Amery Community Club; vice-president of the Wisconsin State Telephone Association and of the Locally Owned Telephone Group of Wisconsin; Amery civil defense director; a director of Apple River Memorial Hospital . . . and others.

It is fairly obvious that George Griffin would rather be mayor of Amery and manager of its telephone company than anything else. But he does have one complaint: it's sure been a long time since he's had a vacation.

Golden Age Manor in Amery, Wisconsin.

Recent Population Changes in Rural Areas

(Calvin L. Beale, a farm population specialist with the U. S. Department of Agriculture, and Donald J. Bogue, of the Population Research and Training Center at the University of Chicago, have recently issued a report on recent U.S. population trends and their causes. From this authoritative report, which takes into consideration findings of the 1960 Census, some observations of particular interest to REA borrowers and others concerned with trends in rural America have been extracted, and are presented below, by permission of the authors.)

The rural-farm population, as counted in the 1960 Census, numbered 13,445,000, or just 7.5 percent of the total population. The count in 1950 was 23,048,000. A heavy decline in farm population has assuredly occurred.

The South and the Northeast show the greatest rates of farm population loss. Heavy declines in the South have stemmed especially from (1) the widespread abandonment of tenant farming in cotton and tobacco areas and the consolidation of land by landlords into larger operating units, (2) the rapid conversion of certain upland areas to forestry, and (3) the reclassification as nonfarm of many residential-type operations, especially in the Appalachian areas. In the overwhelmingly nonagricultural Northeast, the increased conversion of farmland to urban and other nonfarm uses and the reclassification in the Census of many areas from rural to urban have added to the longtime decline of agriculture in that region to produce large farm population losses.

Continuing Agricultural Revolution

Behind the rapid decline in the number of people engaged directly in farming looms the effect of the tremendous revolution in the methods and economics of agriculture—a revolution that has by no means been completed. The following list summarizes those aspects of recent trends within and outside of agriculture that have resulted in a loss of farm population.

1. The difficulties faced by young men in getting started in farming today, in view of the decline in number of farms available because of consolidation trends, and in the light of the high capital resources required for an adequate acreage and equipment to operate it.
2. The low income received from many farm units, especially in comparison with the wages and salaries available from nonfarm jobs.
3. The attraction of city life and nonfarm occupations to younger farm people, associated with higher educational attainment, compulsory military service, short work hours, increased exposure to nonfarm life, and the aspirations of minority racial groups for a better life.
4. A decline in the amount of manpower needed in farming caused by mechanization and by withdrawal of land from production through participation in various Government programs.
5. A decline in the specific need for tenant farmers and full-time resident hired hands brought about by changing technology and other factors.
6. The take-over or use-conversion of farm land by suburbanization, highways, reservoirs, industrial facilities, military bases, recreational facilities, sustained-yield forestry, and other nonfarm uses.
7. Discouragement of older or small-to-medium scale farmers from inability to obtain labor of the number and kind desired or at feasible wages.

8. The increasing burden of real estate taxation.
9. Persistence in some areas of such older rural disadvantages as the lack of good roads, adequate schools, and other community facilities.

The effect of this imposing combination of negative factors is so strong that only in a few scattered areas has the farm population increased or remained stationary. Where reclamation projects or well water irrigation have permitted a rapid intensification of land use—as in the Columbia Basin of Washington or the High Plains of Texas—there has been no shortage of aspiring younger farmers to compete for the land. This would seem to indicate that although farming has lost prestige for some as an occupation, there are still many people who would like to go into it where the conditions are promising.

Recreation

Recreation industries are steadily altering the character of the rural economy. One particular feature of the current great expansion in businesses based on use of leisure time is the rapid increase in, and dispersion of, dams. Dams are usually built for an avowed purpose other than recreation—such as flood control, reclamation, navigation, or power—but almost without exception they soon become important as recreational centers. Some of the most traditionally landlocked States now have large expanses of reservoir water surface and an ardent clientele of water sportsmen and vacationists. Dams, State parks, and other recreational facilities provide many new opportunities for employment, and especially for the founding of small trade and service businesses. They tend to attract urban people to rural areas to run such businesses and thus diversify both the rural economy and the rural population. Such areas, if sufficiently large and attractive, also become centers for retirement of older people. Perhaps the best example of the transformation of an interior rural county through the building of a dam is Camden County, Missouri, where the population grew by 16 percent during the 1950's as the result of businesses and retirement homes fostered by the Bagnell Dam and its reservoir, the Lake of Ozarks. The rural economy and population had declined in this county for 50 years before the recent reversal.

Drift Toward Warmer Climates

With few exceptions, those portions of the Nation which have severe winters are experiencing below-average growth, and almost the entire zone of the country that is blessed with mild winters is growing rapidly. For example, those economic subregions which have an average January minimum temperature of less than 10 degrees showed an overall population increase of 10 percent from 1950-1960, whereas the subregions having an average January minimum of 40 degrees or more had a population growth of 45 percent. In part, this development is being created by the building of "retirement colonies" by elderly people moving to Florida, the entire Gulf of Mexico coast, and into Arizona and California. Social Security first made a mass move of this type possible two decades ago, and steadily it is swelling into a major social movement. Canadians as well as U. S. citizens join in it. Probably the movement will double and redouble in volume in the next two decades. Even inland places, such as the Sandhills of Carolina and Georgia (which are dry as well as mild), the Ozarks, and the Appalachian Uplands are attracting folks entering retirement and desiring or needing a change of climate.

But this drift toward warmer climates appears to be more than just an older-folks phenomenon. Winter brings hazards and inconveniences

which many people of all ages now seek to avoid, and which the heightened national prosperity makes it possible to avoid. Whether the population is leading business or following it is not certain. Yet it is clear that much light industry, such as electronics, missiles, research, and appliance fabrication and assembly is moving into these southern zones also. Air conditioning is making it easier for the newcomers to have the equivalent of a cool summer and a warm winter. Also certain costs of living are lower. As employers become more congestion-conscious and more aware of the desires and values of their employees, it may be expected that more industry than ever before will be located with climate as one of the variables given serious consideration.

To the person with rural interests, the greatest impression from current population trends may be the conclusion that changes in rural communities have never been more radically different from those in urban communities—metropolitan or nonmetropolitan—than they are today. This is not to contradict the fact that in many material aspects of life rural and urban communities are more similar than they were a decade ago. For example, rural areas are closing the gap in availability or possession of electricity and electrical appliances, telephones, indoor running water and bathroom facilities, automobiles, and hard-surfaced roads. However, never before have there been so many rural areas declining in population at a time when most urban areas are growing so rapidly. Never before have there been such differences in the age distribution of farm and nonfarm populations as there are now, nor such disparities in the directions in which the age distributions are changing. Never has the number of deaths approached or exceeded the number of births in rural counties as it is beginning to do in some areas today, in contrast to the large natural increase of population being recorded in the cities. The difference between rural and urban population trends is such that in many rural areas the problem is to find economic uses for land that will retard depopulation, whereas in urban areas the problem is often how to choose between competing demands for land use, caused by high population growth. □

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Special Care Required for Safe Winter Driving, Says Safety Council

With winter around the corner, linemen and crew members should be reminded of the hazards of driving on ice and snow. Here are a half-dozen basic rules for safe winter driving, offered by the Committee on Winter Driving Hazards of the National Safety Council:

1. *Have good tires and tire chains.* Worn tires or worn chains spell trouble. But even with snow tires or tire chains, slower than normal speeds are a "must" on snow and ice.

2. *Be able to see and be seen.* Keep windshield and windows clear. Turn on headlights during daytime snow storms to help others see you. Be sure that your wiper blades, heater and defroster are working properly.

3. *Get the feel of the road.* Keep a constant check on the slipperiness of ice and snow and adjust your speed accordingly. While being careful not to surprise the driver behind you, "feel the road" with a short single brake application, or press the accelerator an instant to find out how easily wheels will slide or spin. Maintain adequate traction; it is your most important safeguard in winter driving.

4. *Follow at a safe distance.* Keep well back of the vehicle ahead so you will have room to stop. It takes from 3 to 12 times more distance to stop on snow and ice than it takes on dry pavement. It's hard to explain why you couldn't stop when the driver ahead did.

5. *Brake before turns.* Anticipate braking needs and start slowing down well before you reach a turn, icy intersection, or slippery crest of a hill. Slow down to a safe speed to avoid a front-end skid at a turn, a rear-end skid on a curve, sliding into an intersection, or tobogganing down a hill out of control.

6. *Pump your brakes.* Pump your brakes to maintain best steering control when braking on ice or slippery snow. Pumping is a fast, locking application followed by full release of the brakes one, two or more times per second. This gives short intervals of maximum braking separated by short intervals of effective steering while wheels are rolling.